



GREEN  
**Salvage**  
/ Remediation

# Missouri

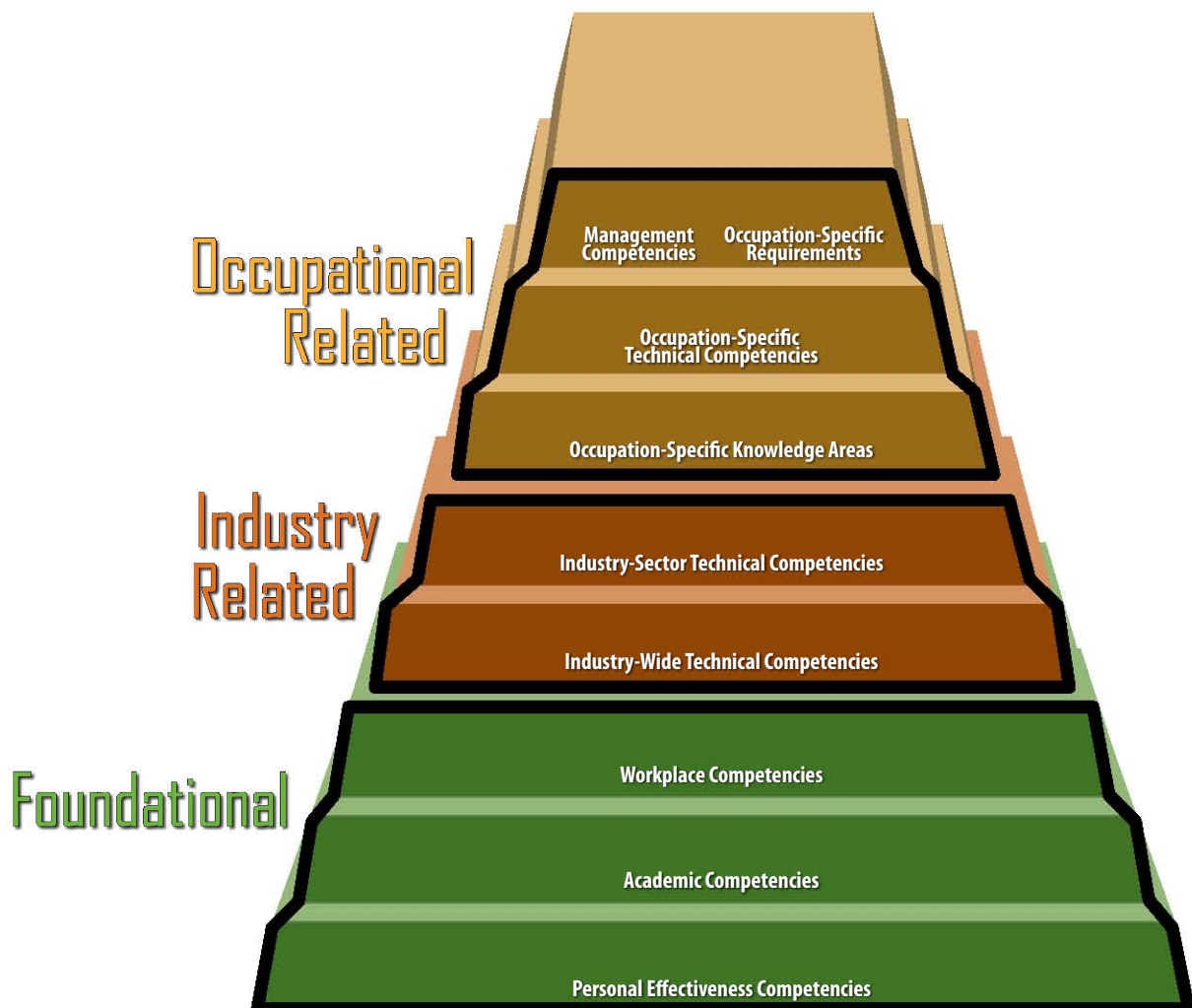


# What is a Competency Model?

## DEFINITION

A competency is a specific, identifiable, definable and measurable skill or characteristic that is essential for the performance of an activity within a specific business or industry context. Some examples of competencies are safety awareness, critical analytical thinking, problem solving, communication and team work.

The first competency model was developed in the early 1970's for the US Department of State by David McClelland and his colleagues of McBer and Company as an alternative selection tool for junior Foreign Service Information Officers. Later McBer and Company developed a methodology that is still highly useful today in competency model building and comprises of "focus on outstanding performers, use of behavioral event interviews and thematic analysis of interview data and distillation of the results into a smaller set of competencies described in behaviorally specific terms". In the last 30 years this technique has gained importance as an integral practice in human resource management.<sup>1</sup>



ADAPTED FROM [WWW.CAREERONESTOP.ORG/COMPETENCYMODEL](http://WWW.CAREERONESTOP.ORG/COMPETENCYMODEL)

<sup>1</sup> Richard Mansfield, *Practical Questions for Building Competency Models*, 2000.

Based on the US Department of Labor's (DOL) framework, the competency model can be described as a pyramid consisting of a hierarchical set of tiers. The pyramid is divided into 3 main blocks of Foundational, Industry Related and Occupation Related competencies. Each of these blocks is made up of tiers which consist of a set of competencies that represent the skills, knowledge and abilities essential to be successful in an occupation in the industry the model represents.

Starting from the base, the tiers cover competencies that are common to several occupations and industries. As we traverse up the pyramid, the competencies become industry and occupation specific. It is important to note that the above picture does not suggest that this is a sequential model i.e. one needs to have all the below competencies in order to possess/develop the higher level competencies. The model is constructed in a bottom-up approach using a combination of research, data collection and analysis, focus groups and case study interviews.

## USES OF COMPETENCY MODELS

Competency Models benefit a wide array of users; as a standard set of skills that can be used for recruiting, profiling jobs, evaluating employees and designing academic and professional certification programs. They serve as a bridge between educators, businesses and other stakeholders who are invested in preparing students and workers for today's workplace challenges.

Competency Models can be used by employers as a useful selection and professional development tool. It can assist HR staff match specific skills and work requirements to different jobs during selection, promotion, career path development and while developing training programs for the organization. It can help to assess performance of individuals in their jobs as well as in their roles of managers, direct reports, customers and team members. It can also be a means for businesses to communicate their performance expectations to their workers.

Competency Models can serve as a measure of the gap between employer needs and the offerings of the current education and training delivery system. Contents of existing coursework can be reviewed and mapped against the tier competencies and a crosswalk can be created and "gaps" can be identified. As education or training providers evaluate existing programs or design new ones, the Competency model can serve as a benchmark, resulting in addition of courses that will match workplace requirements and trends.<sup>2</sup>

Training providers can also use competency models to develop industry-validated certifications. Acquiring such a certification establishes that the graduate of the particular training program has demonstrated mastery in the competencies as stated in model for that industry or sector.<sup>3</sup>

Competency models work as a guide for Workforce Investment Boards and One Stop Career Centers to match job requirements and skill sets determined by employers to potential candidates. In this way an even larger group of individuals such as in-school youth, out-of school youth, dislocated workers, current workers and special needs populations are serviced, thus increasing the talent pool of available workers.

As these key partners work together by sharing assets and resources, the competency model provides a good guidance for government investments in workforce preparation strategies within a region or the state.

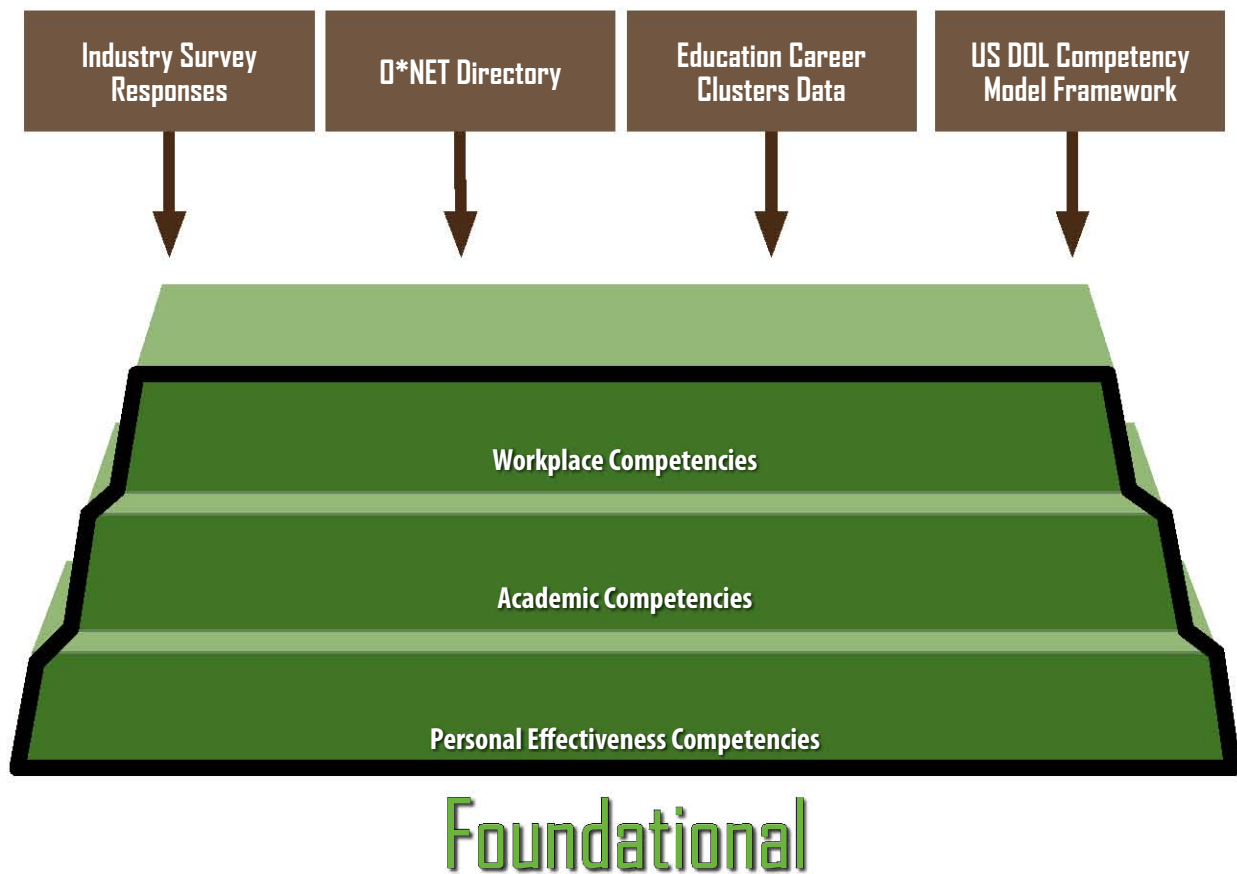
<sup>2</sup> *National Workforce Center for Emerging Technologies, Building a Foundation for Tomorrow, Skills Standard for Information Technology, 2003 edition.*

<sup>3</sup> *Key Links Inc., A Guide for the Overall Usefulness of Industry Competency Models.*

# Missouri Green Competency Model

## METHODOLOGY

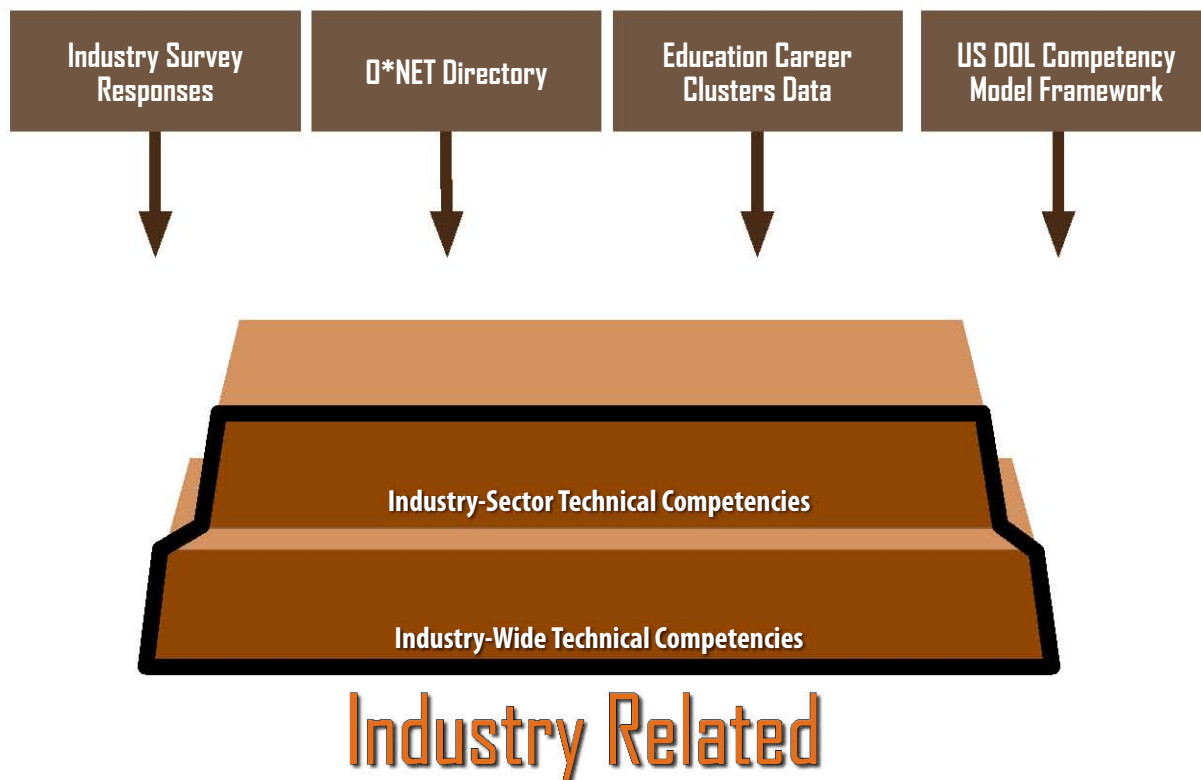
As discussed earlier, the Missouri model uses the US Department of Labor competency model as a framework and consists of a hierarchical pyramid made up of tiers.



Starting from the base is the **Foundational Competencies** block which identifies the essential skills required for early success in school and work life. These competencies are integral for all workers to be successful in any organization, across all occupations and in all industries. The tiers that make up this block are:

- Tier 1: **Personal Effectiveness Competencies**—often referred to as “soft skills”, these competencies are deemed as essential in all life roles.
- Tier 2: **Academic Competencies**—covers basic educational competencies that are learned in an educational setting along with cognitive functions and thinking styles.
- Tier 3: **Workplace Competencies**—includes those skills and abilities that permit an individual to conduct his/her work related activities in an effective and efficient manner.

Data for this was collected via an industry survey designed with a specific set of questions administered to target employers across the state. Industry professionals rated the importance of the competencies as required for their business. The survey responses were then mapped against O\*NET (a system that serves as the nation's primary source of occupational information, providing comprehensive information on key attributes and characteristics of workers and occupations) and the Education Career Clusters (a tool developed by National Career Technical Education Foundation [NCTEF]) data to identify the various competencies in each tier. Each competency is further described in terms of behavioral attributes.



The second block of the pyramid is **Industry Related Competencies** that are common to all jobs within a particular industry and reflects the consensus of industry professionals collected through the survey as well as case study interviews. This block is made up of:

- Tier 4: **Industry-wide Technical Competencies**—represents the knowledge, skills and abilities required by all occupations within a specific industry. Each industry has a unique set of technical competencies that have been defined by the respective subject matter experts (SME's).
- Tier 5: **Industry-Specific Technical Competencies**—represent knowledge, skills and abilities required for occupations within a specific industry sector.

The analysis for this block follows the same methodology as described earlier.



The last block consists of **Occupation Related Competencies** and is defined in terms of occupation related knowledge, education, credentials and performance. A specific set of occupations are selected for all the analysis in this block and are Identified by creating a custom industry staffing pattern for the given industry cluster in Missouri. This is then sorted by each occupation's impact on the economy and then mapped against the US DOL's In Demand occupation list for the given industry cluster. This block consists of the following tiers:

- Tier 6: **Occupation-Specific Knowledge Areas**—represents specific knowledge areas that are required for the select occupations. Each knowledge area covers an area of expertise that the respective occupation requires.
- Tier 7: **Occupation-Specific Technical Competencies**—details all the required certain technical competencies to perform the job.
- Tier 8: **Occupation Specific Requirements**—includes occupation specific job credentials such as educational degrees, certifications, licensures and physical training requirements specific to a particular occupation within an industry. The US Department of Education provides a taxonomic scheme of programs of study and descriptions called Classification of Instructional Programs (CIP). The National Crosswalk Service Center linked this data with the list of occupations in the O\*NET Directory and created a comprehensive list of instructional programs for each occupation in each industry.
- Tier 9: **Management Competencies**—includes competencies that are specific to supervisory and managerial occupations within this industry.

The competencies identified in this block are derived from the O\*NET directory.



## GREEN SECTORS

As per the Missouri Green Job's Report, the state's green economy is comprised of the following six sectors:

### **Building**

Energy Efficiency and the long term cost savings provided by green building products will continue to appeal to consumers and industry alike. Missouri has the opportunity now to transition its construction related workforce over to a profitable industry which may one day completely replace traditional building practices.

### **Energy Production**

New renewable energy initiatives are expected to drive green energy production and purchasing well beyond existing capacity. As population and industry demand for megawatts increase, so too will Missouri's need to create jobs in Wind, Solar, Hydro-Electric, Bio-Mass and Bio-fuel energy production. In addition, future innovations in green technology will allow for cleaner coal and nuclear energy production.

### **Farming**

The production of bio-fuel inputs will help to reduce our reliance on fossil fuels in the future. More efficient cellulosic bio-fuel crop sources will expand the available production acreage in Missouri and fuel new farming jobs. In addition, the number of organic farms is on the rise in Missouri. Smaller lots can support niche organic heirloom crops and also add to production acreage in the state resulting in new income to Missourians. Green forestry certification is another opportunity to brand the state as green friendly and be included in the LEED approved wood products supply chain.

### **Manufacturing**

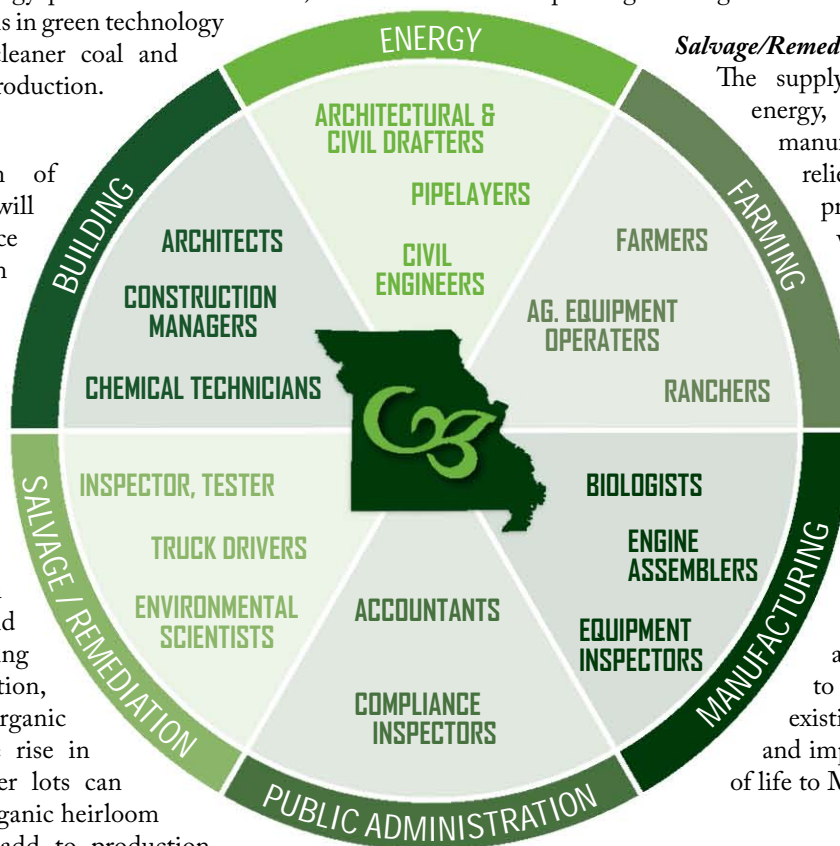
Research, Development and Production of advanced green technology products are essentially the most fundamental drivers of green job creation in Missouri. Potential global demand for this sector's exports is staggering. Growing and keeping entrepreneurship within these technology categories will reap only positive benefits for the state.

### **Public Administration**

The administration of federal, state and local green initiatives will create jobs at all levels of government. Conservation, regulation, certification, incentives and economic development are major areas of interest in the public governing and utilities sector.

### **Salvage/Remediation**

The supply chain of green energy, building and manufacturing products relies on efficient processing of waste materials. The conversion, distribution and sale of recycled raw materials create jobs integral to the green economy. The removal of hazardous materials and remediation of building sites is also important to sustaining our existing communities and improving the quality of life to Missourians.



## GREENING OF THE COMPETENCY MODEL

The greening of the U.S. economy is changing the world of work—new green occupations are emerging; the demand for certain existing occupations is increasing; and, for many occupations, skill requirements are changing. This new Green Economy will change the way companies do business, how products are manufactured and workers are educated and trained.

O\*Net focuses on the “greening” of the occupations and thus categorizes green jobs into three occupational categories:<sup>4</sup>

- ▶ **Green Increased Demand Occupations**

The impact of green economy activities and technologies is an increase in the employment demand for an existing occupation. However, this impact does not entail significant changes in the work and worker requirements of the occupation. The work context may change, but the tasks themselves do not.

- ▶ **Green Enhanced Skills Occupations**

The impact of green economy activities and technologies results in a significant change to the work and worker requirements of an existing O\*NET-SOC occupation. This impact may or may not result in an increase in employment demand for the occupation. The essential purposes of the occupation remain the same, but tasks, skills, knowledge and external elements, such as credentials, have been altered.

- ▶ **Green New and Emerging (N&E) Occupations**

The impact of green economy activities and technologies is sufficient to create the need for unique work and worker requirements, which results in the generation of a new occupation relative to the O\*NET taxonomy. This new occupation could be entirely novel or “born” from an existing occupation

Missouri defines green jobs as those directly involved in generating or supporting a firm’s green-related products or services. It is also evident that green economy in the state will consist of new jobs, transition jobs and displacing some existing jobs.<sup>5</sup>

Previously competency models have been defined for specific industry but none have examined a concept that traverses several industries. “Green” encompasses a large spectrum of industries and occupations within them, the skill levels for these jobs are varied. The Missouri Green Industry Competency Model presented in this report treats each of the green sectors described earlier as an individual industry and discusses competencies for the specific green occupations within them.



<sup>4</sup> David Rivkin & Phil Lewis, *Greening of the World of Work: Implications for O\*NET-SOC and New and Emerging Occupations*, 2009.

<sup>5</sup> MERIC, *Missouri Green Jobs Report 2009*



# Green Salvage/Remediation Competency Model



## *What is Green Salvage/Remediation?*

The supply chain of green energy, building and manufacturing products relies on efficient processing of waste materials. The conversion, distribution and sale of recycled raw materials create jobs integral to the green economy. The removal of hazardous materials and remediation of building sites is also important to sustaining our existing communities and improving the quality of life for Missourians.

## Green Salvage/Remediation



In this section the results of the Green Salvage & Remediation Competency Model analysis are discussed. Each tier lists the most essential competencies and each competency is further described in terms of behavioral attributes.

### TIER I—Personal Effectiveness Competencies

INTEGRITY	PROFESSIONALISM	INITIATIVE	DEPENDABILITY & RELIABILITY	WILLINGNESS TO LEARN
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#### INTEGRITY

- ▶ Apply ethical standards of the industry to workplace/jobsite conduct
- ▶ Treat others with honesty, fairness and respect
- ▶ Demonstrate respect for property of customers, employer and coworkers
- ▶ Take responsibility for accomplishing work goals within accepted timeframes
- ▶ Accept responsibility for one's decisions and actions

#### PROFESSIONALISM

- ▶ Take pride in one's work and the work of the organization
- ▶ Demonstrate self-control by keeping emotions in check
- ▶ Accept criticism and deal calmly with stressful situations
- ▶ Dress appropriately for the workplace/jobsite
- ▶ Maintain appropriate personal hygiene
- ▶ Refrain from substance abuse

## INITIATIVE

- ▶ Pursue work with energy, drive and effort to accomplish tasks
- ▶ Persist at a task or problem despite interruptions, obstacles, or setbacks
- ▶ Work independently and perform effectively even with little or no supervision
- ▶ Demonstrate the ability to change from one task to another
- ▶ Take initiative to seek out new responsibilities
- ▶ Establish and maintain challenging, but realistic work goals

## DEPENDABILITY & RELIABILITY

- ▶ Arrive at work fit and on time each day
- ▶ Avoid absenteeism
- ▶ Work accurately and quickly under pressure
- ▶ Complete assignments and meet deadlines
- ▶ Comply with rules, policies and procedures such as safety, personal hygiene, personal discipline, substance abuse, employee theft and sexual harassment

## WILLINGNESS TO LEARN

- ▶ Uses material taught in classroom and on the job training in work situations
- ▶ Treats unexpected circumstances as opportunities to learn and adopt new techniques
- ▶ Desires, shows willingness to learn new assignments, procedures and technologies

### TIER 2—Academic Competencies

READING	MATHEMATICS	BASIC COMPUTER SKILLS	COMMUNICATION: LISTENING & SPEAKING	ENGINEERING & TECHNOLOGY	CRITICAL & ANALYTICAL THINKING
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## READING

- ▶ Read and understand technical and workplace documents such as contracts, regulations, manuals, reports, memos, forms, graphs, charts, tables, calendars, schedules, signs and notices
- ▶ Read and understand operating directions, installation instructions and standard operating procedures
- ▶ Recognize the meaning of specialized words or phrases unique to the industry
- ▶ Apply what is learned from written material to follow instructions and complete tasks
- ▶ Communicate ideas, information and messages which may contain technical material, in a logical manner

## MATHEMATICS

- ▶ Adds, subtracts, multiplies and divides with whole numbers, fractions, decimals and percents; calculates average, ratios, proportions and rates
- ▶ Takes measurement of time, temperature, distance, length, width, height, perimeter etc.
- ▶ Correctly converts from one measurement to another
- ▶ Translates practical problems into useful mathematical expressions and uses appropriate mathematical formulas and techniques
- ▶ Solves simple algebraic equations
- ▶ Is able to determine slope, midpoint and distance
- ▶ Calculates perimeters, areas and volumes of basic shapes and solids
- ▶ Reads, tracks and calculates gauge measurements

## BASIC COMPUTER SKILLS

- ▶ Understands and efficiently uses basic computer hardware and software to perform tasks and is familiar with fundamental capabilities of computers
- ▶ Enters data into computer with acceptable degree of accuracy
- ▶ Uses word processing programs to create, edit and retrieve files
- ▶ Uses spreadsheet software to enter, manipulate, edit and format text and numerical data
- ▶ Uses electronic mail applications
- ▶ Uses the internet and web based tools to manage basic workplace tasks

## COMMUNICATION: LISTENING AND SPEAKING

- ▶ Listens carefully to others and correctly interprets information provided by others
- ▶ Speaks clearly, in a logical organized and coherent manner
- ▶ Is able to incorporate information into actions

## ENGINEERING AND TECHNOLOGY

- ▶ Applies basic engineering principles and the appropriate technical solution to a problem
- ▶ Applies principles of engineering science and technology, techniques, procedures and equipment to the design and production of various goods and services
- ▶ Identifies and selects the appropriate hand or small electric tools or diagnostic equipment for the work
- ▶ Solves problems where a variety of mechanical, electrical, thermal or fluid faults could be the reason for the problem

## CRITICAL AND ANALYTICAL THINKING

- ▶ Identifies inconsistent or missing information
- ▶ Critically reviews, analyzes, synthesizes, compares and interprets information
- ▶ Tests possible hypotheses to ensure the problem is correctly diagnosed and the best solution is found

### TIER 3—Academic Competencies

TEAMWORK	PLANNING & ORGANIZING	WORKING WITH TOOLS & TECHNOLOGY	PROBLEM SOLVING & DECISION MAKING	FOLLOWING DIRECTIONS
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### TEAMWORK

- ▶ Accepts membership in team and uses best practices for successful team functioning
- ▶ Works effectively in multi-disciplinary teams
- ▶ Gives and receives feedback constructively
- ▶ Leverages the strengths of others to accomplish a common goal
- ▶ Is open to considering new ways of doing things and the merits of new approaches to work

### PLANNING & ORGANIZING

- ▶ Prioritizes various competing tasks and performs them quickly and efficiently according to their urgency
- ▶ Finds new ways of organizing work area or planning work to accomplish work more efficiently
- ▶ Estimates resources needed for project completion; allocated time and resources effectively

- ▶ Anticipates obstacles to project completion and develops contingency plans to address them; take necessary corrective action when projects go off-track
- ▶ Plans and schedules tasks so that work is completed on time
- ▶ Makes arrangements that fulfill all requirements as efficiently and economically as possible
- ▶ Responds to the schedules of other affected by arrangements; giving them complete, accurate and timely information
- ▶ Keeps track of details to ensure work is preformed accurately and completely
- ▶ Takes steps to verify all arrangements, recognizes problems, generates effective alternatives and takes corrective actions
- ▶ Effectively coordinates the transition of employees at the beginning and end of each work shift; disseminates crucial information in an organized manner to rapidly bring employees up to speed at the start of their shifts

## WORKING WITH TOOLS & TECHNOLOGY

- ▶ Selects and applies appropriate tools or technological solutions to frequently encountered problems
- ▶ Carefully considers which tools or technological solutions are appropriate for a given job and consistently chooses the best tool or technological solution for the problem at hand
- ▶ Demonstrates an interest in learning about new and emerging tools and technologies; seeks out opportunities to improve knowledge of tools and technologies that may assist in streamlining work and improving productivity
- ▶ Knows how to maintain and troubleshoot tools and technologies
- ▶ Uses basic computer technology to receive work orders, report progress and maintain records

## PROBLEM SOLVING & DECISION MAKING

- ▶ Anticipates or recognizes the existence of a problem
- ▶ Identifies the true nature of the problem by analyzing its component parts
- ▶ Effectively uses both internal and external resources to locate and gather information; examines information obtained for relevance and completeness; recognizes important gaps in existing information and takes steps to eliminate those gaps; recalls previously learned information that is relevant to the problem; organizes information as appropriate to gain a better understanding of the problem
- ▶ Integrates previously learned and externally obtained information to generate a variety of high quality alternative approaches to the problem
- ▶ Skillfully uses logic and analysis to identify the strengths and weaknesses, the costs and benefits and the short and the long-term consequences of different approaches
- ▶ Decisively chooses the best solution after contemplating available approaches to the problem; makes difficult decisions even in highly ambiguous or ill-defined situations; quickly chooses an effective solution without assistance when appropriate
- ▶ Commits to a solution in a timely manner and develops a realistic approach for implementing the chosen solution; observes and evaluates the outcomes of implementing the solution to assess the need for alternative approaches and to identify lessons learned
- ▶ Uses scientific rules and methods to solve problems

## FOLLOWING DIRECTIONS

- ▶ Receives, interprets, understands and responds to verbal messages and other cues
- ▶ Picks out important information in verbal messages
- ▶ Interprets complex instructions and their relevance to the work assignment
- ▶ Asks questions to clarify unclear directions
- ▶ Acts upon the instruction to complete an assignment



## TIER 4—Industry-Wide Competencies

## INDUSTRY CONCEPTS &amp; FUNDAMENTALS

## REGULATORY COMPLIANCE

## OPERATIONS &amp; MAINTENANCE

## SAFETY &amp; SECURITY

## INDUSTRY CONCEPTS &amp; FUNDAMENTALS

- ▶ Basic Industry Knowledge and Concepts
- ▶ Operational Procedures — Developing /Applying
- ▶ Knowledge of Water and Waste Treatment systems

## REGULATORY COMPLIANCE

- ▶ FEMA, SEMA
- ▶ Basic of Regulations and Regulatory Agencies that oversee remediation industry
- ▶ Industry Codes and Standards
- ▶ Laws and Regulations
- ▶ State and Federal Statutes
- ▶ Technical Specifications Development

## OPERATIONS &amp; MAINTENANCE

- ▶ Day to Day Operations and Maintenance of facility
- ▶ Troubleshooting

## SAFETY &amp; SECURITY

- ▶ Conservation
- ▶ Environmental Safety
- ▶ Facility and Cyber Security
- ▶ General Salvage & Remediation Administration
- ▶ Industrial Safety
- ▶ Safety Awareness

## TIER 5—Industry-Sector Competencies

## WASTE MANAGEMENT

## RECYCLING

## WASTE CONVERSION

The analysis in the section that follows will be focused on the Target Occupations (does not include the all occupations in this industry) within Green Salvage & Remediation that were identified by creating a custom industry staffing pattern for this industry cluster in Missouri. This was then sorted by each occupation's impact on the economy and then mapped against the US DOL's In Demand occupation list for Green Salvage & Remediation. The Target Occupations for this sector are:

## O\*NET SOC Code

## Title

17-2051

Civil and Waste/Wastewater Engineers

53-7081

Refuse and Recyclable Materials Collectors

TIER 6—Occupation-Specific Knowledge Areas

CIVIL AND WASTE/WASTEWATER ENGINEERS	REFUSE AND RECYCLABLE MATERIALS COLLECTORS
<div>⇒ • Engineering and Technology</div> <div>⇒ • Design</div> <div>⇒ • Building and Construction</div> <div>⇒ • Mathematics</div> <div>⇒ • English Language</div> <div>⇒ • Physics</div> <div>⇒ • Transportation</div> <div>⇒ • Administration and Management</div> <div>⇒ • Customer and Personal Service</div> <div>⇒ • Public Safety and Security</div>	<div>⇒ • Customer and Personal Service</div> <div>⇒ • Transportation</div>



## TIER 7—Occupation-Specific Technical Competencies

## CIVIL AND WASTE/WASTEWATER ENGINEERS CHEMISTRY

## TOOLS USED IN THIS OCCUPATION

- ⇒ **Compasses** — Dividers
- ⇒ **Distance meters** — Electronic distance measuring devices; Rhodes arcs
- ⇒ **Levels** — Laser levels; Precision levels
- ⇒ **Scales** — Drafting scales; Rolling scales
- ⇒ **Theodolites** — Total stations

## TECHNOLOGY USED IN THIS OCCUPATION

- ⇒ **Analytical or scientific software** — HEC-1 \*; Hydraulic modeling software; Trimble Geomatics Office; WinTR-55 \*
- ⇒ **Computer aided design CAD software** — Autodesk AutoCAD software; Bentley InRoads Site; Eagle Point Site Design; Mathsoft Mathcad
- ⇒ **Map creation software** — Cartography software; ESRI ArcView; Geographic information system GIS software; Intergraph MGE
- ⇒ **Project management software** — Cost estimating software; Microsoft Project; The Gordian Group PROGEN Online
- ⇒ **Word processing software** — Corel WordPerfect software; Microsoft Word

## REFUSE AND RECYCLABLE MATERIALS COLLECTORS

## TOOLS USED IN THIS OCCUPATION

- ⇒ **Not Applicable**

## TECHNOLOGY USED IN THIS OCCUPATION

- ⇒ **Not Applicable**

## TIER 8—Occupation Specific Requirements

SOC CODE	OCCUPATION	CIP CODE	CIP TITLE
17-2051	Civil and Waste/Wastewater Engineers	14.0801	Civil Engineering, General
		14.0804	Transportation and Highway Engineering
		14.0805	Water Resources Engineering
53-7081	Refuse and Recyclable Materials Collectors		Not Applicable

## TIER 9—Management Competencies

- ⇒ Manpower Planning
- ⇒ Delegating
- ⇒ Managing Work Flow
- ⇒ Entrepreneurship
- ⇒ Leadership
- ⇒ Developing & Monitoring
- ⇒ Preparing and Managing Budgets
- ⇒ Team Building
- ⇒ Developing an Organizational Vision
- ⇒ Managing Resources





**Department of Economic Development**

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